DOCUMENT RESUME

ED 194 922 CS 503 124

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TITLE Tapping a Neglected Market for Nontraditional Students: Continuing Education for Engineers.
PUB DATE Nov 80
NOTE 14p.: Paper presented at the Annual Meeting of the Speech Communication Association (66th, New York, NY, November 13-16, 1980).

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Curriculum Development: Educational Needs: *Engineering Education: Engineers: Higher Education: Interdisciplinary Approach: *Professional Continuing Education: Professional Development: *Speech Communication

ABSTRACT

Designed to aid speech communication educators who want to attract engineers and engineering students to their classes, this paper provides a brief profile of the engineering profession and the engineering professional, proposes courses to meet the needs of these students, and offers some suggestions on how to adapt the speech communication classroom to the predispositions these students bring with them to the speech communication classroom. The paper notes that the engineering profession has become aware of the need for engineers to be able to manage people and projects, and that participating in courses offered by speech communication departments would help to accomplish this goal. (RL)

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Tapping a Neglected Market for Nontraditional Students: Continuing Education for Engineers

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CS503124

Presented at the annual meeting of the Speech Communication Association, New York City, November 13-16, 1980.

Tapping a Neglected Market for Nontraditional Students:

Continuing Education for Engineers

Introduction

There are over one million engineers in the United States today. As technology changes, the engineering profession is becoming increasingly aware of the need for continuing education for engineers to keep their technical skills at an optimum level. In addition to technical knowledge, however, many engineers are beginning to desire knowledge which will help them cope with "forces outside the clear, precise world of facts and figures and designs and specifications" (McKee, 1979, p. 32). According to McKee (1979):

> There is . . . a responsibility to be assumed by firm management--whether it be private practice, industry, construction, or whatever--to encourage and assist its employed engineers to improve their abilities. It must be clear that such improvement is not limited to technical matters. Public service demands much more. It requires the knowledge and ability to manage people and projects and to do it professionally. It requires a knowledge and comprehension of what professionalism really is. (p. 32, emphasis added)

Participating in courses offered by speech communication departments would help to accomplish this goal. Up to this point, however, many speech communication educators

have not attempted, in any systematic way, to attract engineers or engineering students to their classes. To aid educators who want to attract this type of student, this paper includes a brief profile of the engineering profession and engineering professional, proposes courses to meet the needs of these students, and some suggestions on how to adapt the speech communication classroom to the predispositions these students bring with them to the classroom.

Profile of the Engineering Profession

There are approximately 350,000 Professional Engineers in the United States. Engineers are entitled to use the label "Professional Engineer" after passing an Engineer in Training exam, working with a licensed engineer for a specified length of time (generally four years), and passing a practical exam. Engineers who work for large corporations or for the government, however, are not required to be licensed. Thus, there are 500,000 to 1,500,000 people working in engineering jobs who are considered "engineers."

The engineering profession is predominantly male. Less than 10 percent of the graduating engineers in 1979 were female, and an even smaller percentage of practicing engineers are female (Baum, 1980).

Few students who graduate from college with an

engineering degree actually do "engineering work." Half of all students who graduate with a Bachelor of Science in Engineering degree enroll in Master of Science programs, while the other half enter such non-engineering jobs as sales, marketing, government policy and administration. Less than half of the students who do enter the workforce as engineers stay engineers until they retire. Engineering is often used as a stepping-stone to a management career. In addition, due to the rapid change in technological fields, older engineers are often considered out-of-date and are replaced with engineers whose education is more recent.

Every year, approximately 50,000 to 60,000 Bachelor of Science in Engineering degrees are awarded by U.S. colleges and universities. At the moment, demand for these students is 50 percent greater than the supply (Baum, 1979). The U.S. Department of Labor estimates that an average of 53,000 engineering jobs will open up every year until 1985 (Shorin, 1979).

Today, approximately 70 percent of all engineers are employed in private industry (Shorin, 1979). Governmental agencies such as NASA, the Nuclear Regulatory Commission (NRC), highway departments, and local communities employ 15 to 20 percent of all engineers. Five to 10 percent are in private consulting practices, and five to 10 percent are academics--teachers or researchers in

academic contexts. Of the four largest engineering fields, in 1976 there were 300,000 electrical engineers, 185,000 mechanical engineers, 200,000 industrial engineers and 170,000 civil engineers (Shorin, 1979).

The engineering profession suffers from a certain fragmentation. Unlike professions such as law or medicine which each have a common professional organization, engineering has approximately 150 organizations. There are three major types of engineering organizations: (1) technical societies; (2) professional societies; and (3) societies with specific purposes or goals.

Technical societies organize technical conferences and workshops and publish technical journals. The majority of engineering organizations fall into this category.

Professional societies include professional specialty societies like the Institute for Electrical and Electronic Engineers (IEEE) and "founder societies" like the American Society of Civil Engineers (ASCE), American Society of Mechanical Engineers (ASME), and American Institute of Chemical Engineers (AIChE). IEEE, the largest society and only international one, includes about 10 percent of all engineers in its membership. ASCE was established in 1852 to distinguish civil engineers in the private sector from military engineers. The founders of ASCE wanted to raise the status of engineering to a profession and to be <u>the</u> engineering

society. Each society was originally dominated by a corporate interest group. For example, IEEE was dominated by utility companies and AIChE was dominated by the chemical industry. Many of these ties still exist today. It has been estimated that academics hold 50 percent of the governing positions in professional societies, while corporate executives hold the other 50 percent (Baum, 1979).

Societies with specific purposes or goals have purposes other than the professional development of members. The National Society of Professional Engineers (NSPE) lobbies in Washington on behalf of its members who must be registered Professional Engineers. The National Council of Engineering Examineers (NCEE) is responsible for engineering registration tests, while the Engineers' Council for Professional Development (ECPD) accredits engineering degree programs.

Thus, engineering is a diverse profession attracting large numbers of college students because of its good employment outlook. Although it is generally not difficult for college graduates to obtain initial employment, older engineers often face the choice of going into management or losing their jobs to more recent graduates. Engineers who stay in the engineering field may belong to 150 engineering organizations with different purposes and goals. Many of these organizations encourage their members

to enroll in continuing education courses to improve their technical skills. Increasingly, these organizations are encouraging members to explore areas outside the purely technical. Speech communication educators can tap this market by attracting engineers to their classrooms.

Speech Communication for Engineers

Practicing engineers are likely to have a variety of needs ranging from public speaking training to conflict resolution. Reisser (1980) claims that colleges can appeal to adult learners by offering courses in practical skills needed for upward mobility. These courses may include management skills, public speaking, and the latest techniques in a trade or profession. Speech communication courses may deal with each of these areas.

Although graduating engineers start out with higher paying jobs than liberal arts graduates (the minimum salary for an engineering graduate is $14,000), engineering salaries tend to level out by mid-career (Shorin, 1979). In 1975, the average salary for professional engineers was $23,000, but the ceiling was about $42,000 (Shorin, 1979). Thus, many engineers turn to management careers where there is virtually no salary limit. Engineers who choose management careers, however, face numerous problems because, as Baum (1980) notes, "engineers

generally have a preference for working with things rather than with people, they are uncomfortable with and expressing personal feelings and emotions" (p. 11). Engineers tend to "view people in simple black and white terms" (Baum, 1980, p. 13). Courses in interpersonal and organizational communication can show engineers effective ways of dealing with people. These techniques may be extremely valuable to an engineer who is used to dealing with problems by himself. Courses in small group discussion can introduce an engineer to techniques of group problem-solving which may be useful in solving complex technological problems that are beyond the scope of one person's ability to solve.

The Code of Ethics of the National Society of Professional Engineers charges engineers with extending public and professional knowledge of technical projects. One way engineers might choose to accomplish this task is through presentations to community or professional groups. Many, if not most, engineers have had no training in public speaking. As students, engineers tend not to choose performance courses as electives. Engineering students tend to enjoy courses which have assignments that have definite right and wrong answers and that can be completed in private not in front of a class. If engineers are to make a significant contribution to their community and their profession, they

must be encouraged to develop skill in public speaking. Engineering students should be encouraged to take public speaking courses and to learn to present technical ideas to a non-technical audience. Speech communication teachers should stress to students that, in our increasingly technological world, they must be able to present their ideas (such as the benefits of nuclear power) to a lay audience. Practicing engineers who have already realized this need should be recruited for public speaking classes and given a chance to polish their skills.

Professional engineering societies, such as IEEE, are becoming increasingly concerned with professional ethics. An increasing number of engineering curriculums are including a course in engineering ethics. These courses deal with topics such as freedom of expression and evaluation of employer or supervisor. Many of these courses are team taught by an engineering professor and a philosophy professor. Many speech communication educators are qualified to help teach such courses. Speech communication experts bring a different perspective to these courses than either engineers or philosophers. Our field is deeply rooted in a tradition of freedom of expression, and an exposure to this tradition would benefit students who tend to see problems from an ahistorical perspective.

The Nuclear Regulatory Commission (NRC) is concerned

with problems arising from "the differences of professional opinion expressed by an organization's employees" (NRC Report, p. 1). According to the NRC, "the accumulated day-to-day expertise possessed by employees must be promptly and continually available to top-level management to effectively fulfill its mission" (p. 10). The NRC believes that management and professional employees must "establish a climate conducive to the proper discharge of their mutual responsibilities and obligations" (p. 2). Engineers may learn techniques for creating open organizational communication climates in courses offered by speech communication departments. In addition, they may be exposed to methods of conflict resolution which may be helpful in solving differences of professional opinion in which there are no totally right or totally wrong answers.

If speech communication educators do succeed in attracting engineers to their classes, there is the additional question of whether to offer classes solely for engineers or merely enroll engineers along with other students. In general, ethics in engineering courses will mairly attract engineers. This should be encouraged since engineers may be reluctant to express their doubts about their profession in front of "outsiders." Engineers should, however, be enrolled with other students in courses such as public speaking and organizational

communication. Engineers need to be able to express their ideas clearly to a non-technical audience and to see that the problems in their organizations are the same problems faced by many other organizations. Teachers of these courses should be careful to use examples from engineering whenever possible so the engineers do not feel that the material does not apply to them. Role-playing should also be avoided unless the teacher has established a very good relationship with the engineer. Role-playing is a totally different experience from what the engineer is exposed to in engineering courses or in engineering jobs and, therefore, should be used with caution. An engineer who is embarassed on the first day of class is likely to discount the rest of the semester as "irrelevant." The engineering professional may withdraw from a course which he feels does not correspond to his real-world job.

According to McKee (1979), the objective of continuing education is "to make the participating engineer a better engineer" (p. 32). Speech communication courses may not be able to increase an engineer's technical skills, but they may be able to increase his interpersonal skills. If an engineer is to become a manager someday, these skills are crucial. Thus, speech communication educators have valuable knowledge to pass on to engineering students and practicing engineers.

Engineers should be strongly encouraged to enroll in our classes.

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